

*dry farming*, generally requires that a field be left fallow every other year. The soil can thus store up moisture for a crop the following year.

Great Plains farmers quickly found that wheat is better suited to dry farming than are most other crops. Farmers throughout the plains soon began to produce plentiful wheat crops nearly every year. By the early 1900's, the plains had become one of the world's major wheat-producing regions.

In addition to the Homestead Act, Congress passed another bill in 1862 that had a tremendous effect on agriculture in the United States. This bill was the Morrill Act. It granted the states large areas of land to sell. The proceeds were to be invested and the income used to establish colleges of agriculture and the mechanical arts. The act thus led to the founding of many *land-grant* colleges. These schools, in turn, have produced many of the remarkable advances in U.S. agriculture during the 1900's.

#### Agriculture in the 1900's

Since the 1800's, science and technology have helped make agriculture more and more productive. About 1850, for example, each U.S. farmer produced, on the average, enough food to feed 5 persons. Today, each farmer produces enough to feed more than 50 persons.

Science and technology have contributed to the great increase in farm production in three main ways. They have (1) provided farmers with new sources of power; (2) produced improved plant varieties and improved *lines* (varieties) or breeds of livestock; and (3) developed new agricultural chemicals.

**New Sources of Power.** Steam-powered tractors were developed in the mid-1800's, and some farmers in Europe and the United States began to use them. But the tractors were expensive, and they were difficult to operate. As a result, most farmers continued to use horses and mules to power farm machines.

The first successful gasoline-powered tractors were made in the United States in the early 1890's. However, they were not powerful enough for most farm

work. By the early 1900's, engineers had designed models powerful enough to pull a plow. The first all-purpose tractors appeared in the 1920's. They could be used to power a variety of farm machinery, from combines to cotton pickers. The new tractors gradually replaced work animals and steam-powered machines on almost all U.S. farms. Today, there are about 16½ million farm tractors throughout the world. American farmers own about a fourth of them.

In Japan and several European countries, most farms had electric power service by the mid-1930's. But the extension of electric service to rural areas of the United States was slow until the federal government established the Rural Electrification Administration (REA) in 1935. At that time, only about 10 per cent of all U.S. farms had electric power. The REA helped expand service by granting low-interest loans for rural electric power development. By 1960, more than 97 per cent of all U.S. farms had electricity.

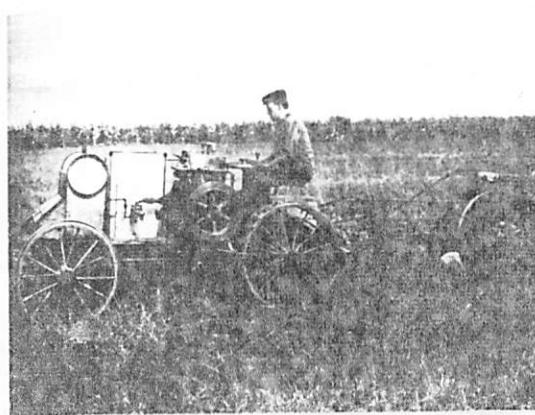
Today, farmers use electric motors to run milking machines, irrigation pumps, and many other farm machines. Farmers also use electricity to operate electronic and automated equipment. This equipment includes devices that fill feeding troughs or collect and grade eggs automatically. Some farmers have direct-dial telephone service to electronic computers at agricultural colleges or other farm information centers. The computers help farmers solve a variety of problems. For example, they can determine the correct mixture of ingredients to use in livestock feed or the profit that can be expected from a particular farm product.

**Improved Plant and Livestock Breeding.** During the mid-1800's, an Austrian botanist and monk named Gregor Mendel discovered the principles of heredity. Mendel thus laid the groundwork for *genetics*—the science that explains how characteristics are inherited. The development of genetics during the 1900's has made it possible to breed plants and animals scientifically.

In the early 1900's, plant breeders in the United States developed a hybrid corn that produced unusually high yields. Various corn hybrids became commercially available in the 1920's. By the early 1960's, more than 95 per cent of all U.S. corn acreage was planted with hybrid seed. Average corn yields increased dramatically—from about 28 bushels per acre (11 bushels per hectare) in the early 1920's to as much as 97 bushels per acre (39 bushels per hectare) in the 1970's.

During the 1950's and 1960's, scientists developed varieties of wheat and rice that gave much higher yields than earlier varieties. The new varieties were intended mainly to help various poor nations, such as India and Mexico, increase their food supply. This effort proved so successful that it has been called the *Green Revolution*.

Livestock breeders developed many improved lines during the 1900's. They also devised intensive selection techniques to speed genetic development. Nutrition specialists improved livestock feeds, and veterinarians improved methods of health care. All these advances helped make livestock more and more productive. For example, the annual average milk production per cow in the United States has increased by more than 2,500



Detail of a photograph (about 1900) taken near Beloit, Wis.; State Historical Society of Wisconsin

**An Early Gasoline-Powered Tractor** did only light work. But it signaled the beginning of a new age of power for farming.